Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

ABOUT

Social enterprises play a pivotal role in addressing social problems, enhancing communities, and advancing environmental sustainability. These enterprises operate by trading goods and services in the open market, with profits reinvested back into the business or local community. They exemplify the fusion of economic viability with social and environmental responsibility.

Under the guidance of their teachers, students can delve into various examples of social enterprises initiated by individuals, both young and old, across the globe. Through this learning unit, students embark on creating their own social enterprise projects, promoting hands-on engagement with sustainable development initiatives.

These projects not only deepen students' comprehension of social enterprise but also align with the United Nations' Global Sustainable Development Goals (SDGs). Additionally, they serve as platforms for nurturing essential core skills such as citizenship, critical thinking, problem-solving, creativity, imagination, and innovation.

By empowering students to engage with social enterprise concepts and SDGs, educators foster a culture of entrepreneurship, innovation, and sustainable development among future generations, contributing to building resilient infrastructure, promoting inclusive industrialization, and fostering innovation for a more sustainable world.

OVERVIEW

Investments in infrastructure, sustainable industrial development, and technological advancement play pivotal roles in driving economic growth, fostering social development, and addressing climate change. Amidst a rapidly evolving global economic landscape and escalating disparities, sustained growth hinges on industrialization that prioritizes accessibility for all individuals and is bolstered by innovation and resilient infrastructure.

Even prior to the onset of the COVID-19 pandemic, global manufacturing, a key driver of overall economic expansion, had been steadily declining due to tariffs and trade disputes. The manufacturing downturn exacerbated by the pandemic has inflicted severe repercussions on the global economy.

This downturn is primarily attributed to soaring inflation, energy price fluctuations, persistent disruptions in the supply chain of raw materials and intermediate goods, and a slowdown in global economic activity.

While least developed countries (LDCs) in Asia have made notable strides, those in Africa must alter their current trajectory and accelerate progress significantly to achieve the 2030 target. Nonetheless, industries in the medium-high and high-technology sectors have exhibited robust growth rates despite these challenges.

LEARNING OBJECTIVES

This unit is designed to support the development of both knowledge and skills. Pupils will learn about the idea of economic enterprise as well as the Sustainable Development Goals. At the same time, they will develop skills such as citizenship, critical thinking and problem solving, creativity and innovation. The materials can be used in a range of different subjects depending on where economic enterprise education might best fit in your curriculum. Subject suggestions are made at the start of each lesson plan.

DRAFT LEARNING OBJECTIVES

As teachers you are encouraged to review these learning objectives and revise them, if necessary, to meet the needs of your pupils and your school's curriculum.

Citizenship: explore the needs of the community in the context of the Sustainable Development Goals (SDGs).

Critical thinking and problem solving: think about the reasons why these challenges exist and identify potential solutions.

Creativity and imagination: design innovative, business-like solutions to address human or environmental challenges.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

© United Nations

PLANNING THE UNIT AND ADAPTING THE MATERIAL

Summary

This resource pack has been developed with the intention of saving time for teachers so that materials don't have to be created from scratch.

However, you are welcome to adapt the resources to make sure they really meet the needs of your pupils. Feel free to use some or all of the resources. You can use them entirely or partially, based on your professional judgment.

Also, these resources can be used in collaboration with teachers and pupils in another school. Notes with ideas and suggestions have been included regarding how these resources could be used in a collaborative project.

Below are the suggested steps for planning the unit and collaborating with other teachers in your school or in a partner school either in your own country or internationally:

1. What do we want pupils to learn?
2. What would be the best way for them to learn this?
3. How will we know what they have learned?
4. What resources do we need?
5. What did pupils learn during the unit?
6. What other reflections do we have about the unit?

Examples

Invest in new, resilient infrastructure in developing nations or upgrade existing infrastructure to enhance sustainability.

Extend the geographical footprint of research and development facilities, bringing R&D capabilities to developing regions.

Foster innovation by allowing all stakeholders to propose inventive solutions to sustainability challenges. Evaluate promising ideas and recognize excellence through awards. Engage a diverse range of stakeholders, including marginalized communities, to ensure that infrastructure development benefits everyone and creates equitable opportunities.

Establish and enforce standards and regulations to ensure that corporate projects and initiatives are managed sustainably.

Collaborate with non-governmental organizations (NGOs) and the public sector to support sustainable growth in developing countries.

TEACHER'S PLANNING TEMPLATE

This can be used individually, in collaboration with colleagues in your school or with teachers teaching the same unit in another country.

Question	Notes	Your thoughts
1. **What do we want pupils to learn ?**	Think about the most important learning objectives for this unit. Read through the materials that have already been created and consider what is most important for your pupils to learn. Reflect on the objectives suggested around citizenship, creativity and imagination, critical thinking and problem solving. Revise them if necessary. Consider the standards of your National Curriculum and reflect: which standards can be met through this learning unit? Be realistic about the time that you have available for this unit and what can be achieved in this time.	
2. **What would be the best way for them to learn this?**	Given the learning objectives you have decided, think about the learning activities that would be most effective for your pupils. What is the best way for them to notice and understand challenges in their community? How can they learn about the meaning of social enterprise? What is the best way to find out how children in other communities and countries have started entrepreneurial projects? How can they design a project that addresses one of the important challenges in your community?	

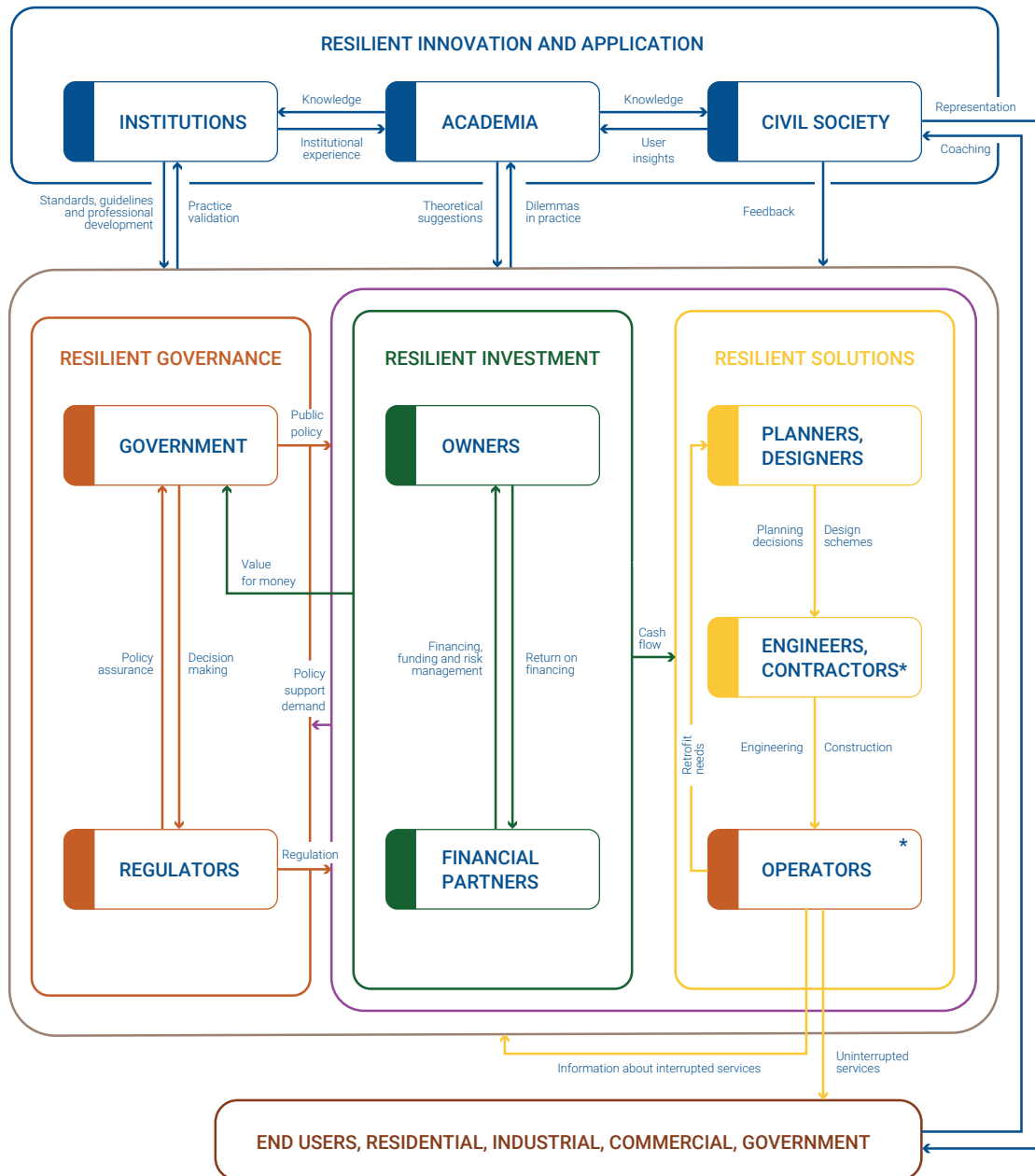| Question	Notes	Your thoughts
3. **How will we know what they have learned?**	Given the learning objectives you have decided, think about assessment. How will you find out what your pupils already know about this topic before the beginning of this unit? What sort of evidence would you need to see that pupils have learned the knowledge, skills or attributes you would like them to learn?	
4. **What resources do we need?**	Given the learning activities you are planning, think about the resources you will need. People – who would you like to engage in the unit, so that pupils can learn more about the challenges in your community and the idea of social enterprise? Written materials, music, art – what additional materials would be beneficial to your pupils in this unit? Places – where would it be useful for your pupils to learn during this unit?	
5. **What did pupils learn during the unit?**	During and after the unit, think about what pupils learned as part of this unit. To what extent did pupils meet the learning objectives of this unit? What other, surprising things did pupils learn? What were pupils confused about?	
6. **What other reflections do we have about the unit?**	During and after the unit, think about what went well with this unit and what could have been done differently. Which learning experiences were particularly valuable? Were the learning activities appropriate? What worked well? What would you do differently next time?	

STAKEHOALDERS

Infrastructure stakeholders are critical for implementing the Principles for Resilient Infrastructure. It provides tailored guidance to the following groups: government, regulators and operators; owners and financial partners; planners, designers, engineers, and contractors; and institutions, academia, and civil society.

Let see how the principles allow stakeholders to design, maintain, and adapt infrastructure, while also highlighting what interventions are relevant at different phases of resilience (i.e.,preparation, absorption, recovery and adaptation).

Each stakeholder group has an important role to play and can add value to infrastructure resilience, for example:

• **Government** can initiate changes to national policy for infrastructure resilience, allocate necessary funding to resilience-building activities, and require that the tendering process for infrastructure projects gives appropriate weighting to resilience considerations.

• **Regulators** can monitor disruptions to critical services, require operators to improve their resilience, and introduce obligations on infrastructure operators to develop and maintain long-term resilience strategies.

• **Operators** can monitor their capacity to absorb disruptions caused by different types of hazards and realize retrofit improvements that improve their ability to absorb future ones.

• **Owners** can raise infrastructure-resilience standards, invest in skills and capacity to achieve infrastructure resilience, and require operators to assess potential hazards.

• **Financial partners** can collect data on hazards and vulnerabilities to improve risk management, and integrate resilience considerations into their decision-making processes.

• **Planners, designers and engineers** can establish initial asset resilience through appropriate plans and designs, provide handover documents and models that inform operational decisions for maintaining resilience, and design ways to collect operational data for monitoring resilience during the operational stage.

• **Contractors** can develop and implement tools that anticipate future needs and generate system resilience, while also creating tools to collect operational data.

• **Academia** can support innovation through research in engineering, architecture, planning, construction and other topics.

• **Institutions** can support resilience by sharing their knowledge and the experience of their industry members, while also providing training for updating knowledge and skills.

• **Civil society organizations** mediate relations with communities by improving local people´s capacity to understand infrastructure resilience; providing a stronger context in communities to support infrastructure resilience; and representing and being the voice of people in the community.

RESILIENT INNOVATION AND APPLICATION

INSTITUTIONS		ACADEMIA		CIVIL SOCIETY

Knowledge

Institutional experience

Knowledge

User insights

Representation

Coaching

Standards, guidelines and professional development

Practice validation

Theoretical suggestions

Dilemmas in practice

Feedback

RESILIENT GOVERNANCE

RESILIENT INVESTMENT

RESILIENT SOLUTIONS

GOVERNMENT

OWNERS

PLANNERS, DESIGNERS

Public policy

Planning decisions

Design schemes

Value for money

ENGINEERS, CONTRACTORS*

Policy assurance

Decision making

Policy support demand

Financing, funding and risk management

Return on financing

Cash flow

Retrofit needs

Engineering

Construction

REGULATORS

FINANCIAL PARTNERS

OPERATORS *

Regulation

Information about interrupted services

Uninterrupted services

END USERS, RESIDENTIAL, INDUSTRIAL, COMMERCIAL, GOVERNMENT

PRINCIPLE - Continuously learning

The goal of this principle is to develop and update understanding and insight into infrastructure resilience. The main actions to realize this goal are presented below.

1.1 Expose and validate assumptions

Assumptions are embedded in models, plans, and operating systems, such as climate-change scenarios used for infrastructure asset design. Despite having significant consequences for the systemic resilience of critical infrastructure, these assumptions are not always tested or made explicit, nor reported regularly and transparently. When disruptions and disasters happen, the assumptions must also be reviewed and revised.

STAKEHOLDER INTERVENTIONS

Each stakeholder has a specific role in implementing this action.

Government

• Guide infrastructure sectors on collecting data about assumptions made in infrastructure models, plans and operating systems.
• Publish timely statistics and studies on assumptions made and highlight opportunities and priorities for improvement.
• Incentivize other stakeholders to share relevant information about their assumptions.

Regulators

• Request information from owners and operators about assumptions in data, models and plans.
• Monitor the quality, comprehensiveness and relevance of assumptions made and determine the weaknesses to be addressed in subsequent iterations of models, plans and operating systems
• Track owners' and operators' capability to validate and improve their assumptions.

Designers, planners, engineers, and contractors

• Collect data during the planning, designing and construction phases, and then report information about assumptions embedded in models, plans and operating systems to regulators and operators.

Operators

• Provide reporting on the assumptions made to regulators and ensure that assumptions do not understate the current and future resilience of critical services.
• Collect and investigate data on failures of infrastructure systems and correlate these data with assumptions made. Identify anomalies and plan for upgrades.

Academia

• Develop innovative tools and models to anticipate potential hazards that can affect assumptions made previously and expose vulnerabilities. Institutions
• Use the knowledge and experience of the members to assess and validate assumptions and priorities.

Institutions

• Use the knowledge and experience of the members to assess and validate assumptions and priorities.

EXAMPLE OF INTERVENTION

The Wellington Lifelines Regional Resilience Project details how investing in infrastructure resilience reduces the national economic impact of a large earthquake. As part of the project, an assumptions report was produced to provide explanation on the assumptions underpinning the economic modelling tool that was used to translate infrastructure damage and other forms of physical disruption into estimates of economic impacts. By having these assumptions published, users can more easily understand how economic impacts are estimated, but also check whether those remain valid over time.

PERFORMANCE ASSESMENT

KPI Name: Management of modelling assumptions

Rationale: Modelling assumptions, including the testing of a limited range of scenarios, plays a critical role in infrastructure resilience. Transparent reporting of the assumptions used helps reveal weaknesses and limitations. Different hazards and infrastructure systems require different reporting schedules. For example, cyber threats and communications infrastructure are far more dynamic than dams and earthquakes. The extent to which assumptions are tested and checked for quality; and whether the results are used to review and improve models, plans and operating systems will indicate the accuracy of a nation's assessment of its systemic resilience.

What to consider:
A. Scope of assumptions: the number of models, plans and operating systems (used for decisionmaking for infrastructure resilience) for which assumptions are reported.

B. Frequency for reporting assumptions: frequency of reporting of models, plans and operating systems related to the number of disruptions and the critical level of the risk.

C. Testing level for assumptions: the proportion of assumptions that are tested and validated.

D. Review level for assumptions: the implementation of recommendations to improve assumptions.

Indicative scoring criteria: The following criteria could be used for scoring this indicator on a scale from 0 to 5:

5   Modelling assumptions used for making decisions on infrastructure resilience are systematically reported, frequently published, tested and reviewed for all sectors.

4   Modelling assumptions are reported, published, tested and reviewed for most infrastructure systems but not for all.

3   Modelling assumptions are reported, published, tested and reviewed for some infrastructure systems but not for most of them.

2   Modelling assumptions used for making decisions for infrastructure resilience are tested, reported and reviewed but not published.

1   Modelling assumptions used for making decisions for infrastructure resilience are tested and reviewed but not reported nor published.

0   Modelling assumptions used for making decisions for infrastructure resilience are not tested, reviewed or reported.

Sources of further information

https://www.preventionweb.net/
https://sdgs.un.org/goals/goal9
https://sdgcompass.org/sdgs/sdg-9/
https://www.un.org/sustainabledevelopment/infrastructure-industrialization/
https://www.undrr.org